



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/816,467	03/31/2004	Hiroshi Nishimura	4641-68043-01	8404
24197	7590	07/26/2005	EXAMINER	
KLARQUIST SPARKMAN, LLP 121 SW SALMON STREET SUITE 1600 PORTLAND, OR 97204			LEYBOURNE, JAMES J	
			ART UNIT	PAPER NUMBER
			2881	

DATE MAILED: 07/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

H'A

<b>Office Action Summary</b>	Application No.		Applicant(s)	
	10/816,467		NISHIMURA ET AL.	
	Examiner		Art Unit	
	James J. Leybourne		2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 32-69 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 59-69 is/are allowed.
- 6) ☒ Claim(s) 32, 34-40 and 43-58 is/are rejected.
- 7) ☒ Claim(s) 33, 41 and 42 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☒ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |  |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>8/16/04</u> . | 6) <input type="checkbox"/> Other: ____  |

**DETAILED ACTION**

1. According to the "Preliminary Amendment" received August 16, 2004, claims 1-31 have been canceled; and claims 32-69 have been added.

***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 38 is rejected under 35 U.S.C. 112, first paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 38, line 7 recites the limitation "adjustment charged particle beam that propagates from the adjustment CPB source to the object". There is no support or disclosure of means for causing a charged particle beam from an adjustment CPB source located on the surface of the X-Y stag to propagate an object located on the X-Y stage in the specification and it is not clear what is claimed.

4. Claims 39, 40 and 43- 47 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in

the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Regarding claim 39, the specification, while being enabling if a baseline has been established (specification, page 25, lines 3-7) for using the measured location and distance to align an evaluated area of the specimen to the first optical axis, the specification does not reasonably provide enablement for performing the alignment if a baseline has not been established. Since claim 39 does not contain steps to establish a baseline, the specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to perform the invention commensurate in scope with this claim.

Claims 40 and 43-47 are not enabled because they depend from claim 39.

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 32, 34, 37, 48-58 are rejected under 35 U.S.C. 103(a) as being unpatentable over prior art admitted in the specification. On page 3, lines 11-15 states "According to one conventional scheme for making such a determination, an off-axis

light-optical system (i.e., an optical system for light) is used in conjunction with the CPB-optical system. In such a scheme, the specimen is mounted on a stage provided with fiducial marks (e.g., a pattern of lines and spaces)."

Regarding claim 32, when a fiducial mark is illuminated by the primary beam it releases secondary electrons, thus it becomes an observational CPB source that generates an observation charged particle beam that is used for adjusting the optical axis.

Regarding claims 34-36 the optical system in a conventional mapping electron microscope comprises an imaging-optical system disposed downstream of an objectives-optical system and the imaging optical system comprises a front lens group (Specification, Fig. 1). The specification does not disclose that a conventional mapping electron microscope comprises a cathode lens or that the imaging-optical system comprises a rear imaging lens group, but these are well known in the art. It would be obvious to of ordinary skill in the art at the time of the invention to use a fiducial mark (as admitted in the specification) to align the axis of all of the lenses between the fiducial mark and the imaging sensor.

Regarding claim 37, the specification further admits that it is known to use an "evaluation chart" for evaluating optical performance (e.g., resolution and aberration) of a CPB mapping microscope, by placing the chart at the position of the specimen 23 in FIG. 1.

Regarding claims 48, 49, 56 and 57, the "prior art" apparatus shown in Fig. 1 has all or the limitations of these claims except an off-axis optical system having an optical

axis situated at a predetermined distance from the axis of the irradiation-optical system, the off-axis optical system comprising a vacuum seal for passing an optical alignment beam for aligning the specimen with the axis of the irradiation-optical system.

On page 3, lines 11-13, the specification teaches that one conventional scheme for determination of positional coordinates uses an off-axis light-optical system (i.e., an optical system for light) in conjunction with the CPB-optical system. In such a scheme, the specimen is mounted on a stage provided with fiducial marks (e.g., a pattern of lines and spaces). The specification does not teach that the conventional scheme uses a vacuum seal and a window such that the optical system can be external to the vacuum system. It would be obvious to one of ordinary skill in the art to place part of the light optical system outside the vacuum chamber to reduce the necessary size of the chamber and for accessibility to the optical system.

Regarding claims 50, 51, 52, 53 and 58, these are all well known components used in optical microscopy.

### ***Allowable Subject Matter***

7. Claims 59-69 are allowed. The following is an examiner's statement of reasons for allowance:

Regarding claim 59, the prior art fails to disclose or make obvious a method for measuring an off-axis distance in an apparatus including a specimen stage, a charged-particle-beam (CPB) optical system having a main optical axis, and an off-axis optical

system having a respective optical axis, the method comprising: providing a first pattern on the specimen stage; obtaining a first image of the first pattern using the off-axis optical system; providing a second pattern at a known distance from the first pattern; obtaining a second image of the second pattern using the CPB optical system; and determining a distance between the main optical axis and the optical axis of the off-axis optical system based on the first and second images

Regarding independent claim 60, the prior art fails to disclose or make obvious a method for measuring an off-axis distance between a main optical axis, and an off-axis optical system in a CPB optical system, the method comprising: providing a first pattern on the specimen stage; obtaining a first image of the first pattern using the off-axis optical system; measuring a first stage position when obtaining the first image; using the CPB main optical system, obtaining a second image of a pattern on the specimen stage, the pattern being either the first pattern or a second pattern situated a known distance from the first pattern; measuring a second stage position when obtaining the second image; and determining a distance between the main optical axis and the optical axis of the off-axis optical system based on the first and second images and the respective first and second stage positions.

Claims 61-64 are allowed by virtue of their dependency on claim 60.

Regarding independent claim 65, the prior art fails to disclose or make obvious a method for evaluating a specimen with an image obtained using a charged particle beam, the method comprising: using an off-axis optical system, obtaining an image of a pattern provided on the specimen; while obtaining the image, measuring a position of a

stage holding the specimen; reading or measuring a stage-position baseline; and calculating a target stage position from the obtained image, measured stage position, and baseline, and moving the stage toward the target stage position.

Claims 66 and 67 are allowed by virtue of their dependency on claim 65.

With respect to the independent claim 68, the prior art fails to disclose or make obvious a method for adjusting the optical axis in a CPM inspection apparatus that comprises a stage for mounting a specimen a charged-particle-beam (CPB) source for generating a charged particle beam from a surface of the specimen, a CPB detector for detecting the charged particle beam, and a deflector situated between the stage and the CPB detector the method comprising: generating a charged particle beam from the CPB source so as to cause the charged particle beam to be generated from the surface of the specimen; obtaining a first image of the specimen by detecting the charged particle beam while not applying a voltage to the deflector; obtaining a second image of the specimen by detecting the charged particle beam while applying a voltage to the deflector; and setting the voltage applied to the deflector based on the first and second images, so as to adjust the optical axis.

Claim 69 is allowed by virtue of its dependency on claim 68.

8. Claim 33, 41 and 42 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is an examiner's statement of reasons for indicating allowable subject matter:



Regarding claim 33, the prior art fails to disclose or make obvious a method for adjusting an optical axis in an inspection apparatus that uses a charged particle beam, the method comprising: providing an observation CPB source on a surface of the X-Y stage; generating an observation charged particle beam from the observation CPB source and obtaining an image of the object at the detector; wobbling a voltage of electrical power applied to a cathode lens; and, while moving the X-Y stage and thus the object relative to and across the optical axis, determining the position of the X-Y stage at which the obtained image of the object does not move as the voltage is wobbled.

Regarding claims 41 and 42, the prior art fails to disclose or make obvious a method for aligning an inspection apparatus, comprising: using a first optical system, guiding a first energy beam from a specimen to a first detector along a first optical axis; using a second optical system, guiding a second energy beam from the specimen to a second detector along a second optical axis; arranging a fiducial plate defining thereon a first mark and a second mark; and obtaining an image of the first mark by the first detector through the first optical system and obtaining an image of the second mark by the second detector through the second optical system to thereby define a distance between the first and second optical axes with reference to a relative positional relationship between the first mark and the second mark.

9. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably

accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance"

***Relevant Prior Art***

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following patents are cited to show further show the state of the art with respect to aligning optical axes in CPB machines:

USPN 6107636 to Maraki discusses using alignment marks formed on a wafer or marks on a stage reference plate.

USPN 5747814 A to Gordon et al. discusses centering a lens in a charged-particle system by using a wobbler to modulate the accelerating voltage or lens.

US 20030025895 A1 to Binnard discusses apparatus and methods for detecting tool-induced shift in microlithography apparatus including shifting the stage between an electron axis and an offset optical axis.

***Conclusion***

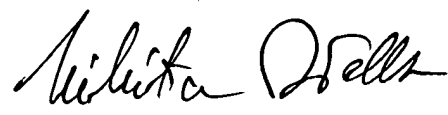
Any inquiry concerning this communication or earlier communications from the examiner should be directed to James J. Leybourne whose telephone number is (571) 272-2478. The examiner can normally be reached on M-F 9:00- 6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R Lee can be reached on (571) 272-2477. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

July 24, 2005

JJL

  
**NIKITA WELLS**  
**PRIMARY EXAMINER** 01/25/05